

entielles à plusieurs variables indépendantes ; M. Volterra, Comment on passe de l'équation de Poisson à caractéristique imaginaire à une équation semblable à caractéristique réel ; in Sections 5 and 6, M. Padoa, Un nouveau système irréductible de postulats pour l'algèbre ; M. Capelli, Sur les opérations fondamentales de l'arithmétique. The attendance at these sectional meetings, all of which were held at the Sorbonne, varied from 50 to 120.

The concluding general meeting was held at the Sorbonne at 9 a.m. on Saturday. The proceedings opened with the sending of a message of greeting to M. Hermite, the président d'honneur of the Congress. It was then unanimously voted that the next Congress be held in Germany, in 1904, at the beginning or end of the summer vacation, the place mentioned as probable being Baden-Baden. M. Mittag-Leffler then delivered his address, "Une page de la vie de Weierstrass," and M. Poincaré spoke briefly on the "Rôle de l'intuition et de la logique en mathématiques," closing the proceedings immediately afterwards with the few words, "La séance est levée ; le congrès est clos."

On the conclusion of the Tuesday afternoon sectional meetings, members were received at the École Normale Supérieure, where a pleasant opportunity for social intercourse was enjoyed ; and at noon on the day after the closing of the Congress a banquet was held at the Salle de l'Athénée-Saint-Germain, when about 160 members sat down. In the absence of M. Poincaré, the proceedings were conducted by M. Darboux ; speeches were made also by MM. Geiser, J. Tannery, Stephanos and Vassilief. A considerable number of members of this and other scientific congresses accepted the invitation of Prince Roland Bonaparte to a scientific *soirée* on Saturday. A *fête* had been arranged by President Loubet for Thursday evening, but could not be held on account of the funeral of the King of Italy ; the invitations were consequently transferred to the *fête* in honour of the Shah on August 10.

It will be seen that very little business was transacted, apart from the reading of papers. At the joint sitting of Sections 5 and 6, it was asked what steps had been taken to put into effect the resolutions of the Zürich Congress as to the formation of a committee to consider certain questions of bibliography, &c., these having been adopted with the hope of ultimately consolidating mathematical enterprise, and directing it into profitable channels. No very satisfactory answer was forthcoming ; M. Laisant, on behalf of the French Mathematical Society, replying that they had done nothing in this line, having been entirely occupied with making material provision for the Congress. He drew the attention of members, however, to the announcement of the *Annuaire des Mathématiciens*, undertaken by Carré et Naud, 3, Rue Racine, which is designed to be a complete register of all mathematicians, with their addresses. It is much to be hoped that these questions, raised at Zürich, will be dealt with in a business-like manner at the Congress of 1904.

#### NOTES.

THE Scientia Club gave a banquet to Lord Kelvin during the International Physical Congress at Paris. M. Louis Olivier presided over a distinguished company, and speeches in appreciation of Lord Kelvin's scientific work were made by him and by Profs. Mascart and Cornu.

FROM the official report of the International Congress of Electricians at Paris, we see that two communications, by Mrs. Ayrton and M. Blondel, were received with great appreciation. Mrs. Ayrton's paper was on the luminous intensity of the electric arc with continuous current, and she showed that the best result, both from the point of view of luminosity and expenditure of

energy, was obtained from an arc only a millimetre in length. Demonstrations in illustration of this conclusion, and showing the absorbing and cooling effects of carbon vapour produced in the arc, as well as the production and absorption of green and yellow radiations, were given by Mrs. Ayrton at a special meeting in the École supérieure d'Electricité. M. Blondel reviewed the progress of electric lighting during the past ten years, and made some very valuable remarks on arc lamps with alternating currents, and on the carbons commonly used in arc lights.

IN opening the business of Section A (Mathematical and Physical Science) of the British Association at the forthcoming Bradford meeting, we understand that Dr. Larmor will review the change of ideas which has recently become current regarding the scope and method of physical explanation. The brilliant experimental verification of Hertz has led to the acceptance on the Continent of the views originated in this country regarding the nature of electric actions and their dependence on the æther ; but there has been a strong tendency to eliminate from the exposition of the theory those dynamical explanations which formed a main feature of its development in the hands of Clerk Maxwell. It is of fundamental importance to consider how far purely descriptive methods can thus avail towards an effective formulation of general physical theory, without appealing to a dynamical foundation of some kind. In all branches of the subject the discrete atomic constitution of matter is reached when we probe deep enough ; thus the method of representation of the physical activities of the material atoms, so far as they can be known to us, is of the essence of a dynamical treatment. This leads on to the cognate question, whether denial of direct action at a distance necessarily implies the passing on of all electric effects from element to element of the medium entirely by simple stress ; if that be too narrow a scheme, the efforts that have been made towards formulation on this basis were foredoomed to failure. The scope and limitations of the method of statistical enumeration of the activities of the atoms, which is the only one now available in ultimate thermodynamic discussions, depend on considerations of a different order. The modern extension of the range of the principle of Carnot also requires us to face the question how far the processes of chemical interaction between atoms, as distinct from the properties of the molecules when formed, are amenable to dynamical representation.—The general scheme for the business of the section is to take physical papers of a mathematical nature on Friday, September 7. On Monday, September 10, the section will divide into two, dealing with mathematics and meteorology respectively. On Tuesday a discussion on ions will be opened by Prof. Fitzgerald. It is also hoped to arrange discussions on the partition of molecular energy, and on the relation of radiation to temperature, under the thermodynamic aspect.

A PASTEUR Institute has just been opened at Kasauli, a hill station in the Punjab district, about thirty miles from Simla. It is thus no longer necessary for a person bitten by a rabid animal in India to journey to Paris for treatment by inoculation. The treatment at the Kasauli Institute is to be given free of charge.

PROF. J. C. BOSE, who has been attending the recent International Congress of Physics at Paris as the delegate of the Government of Bengal, will also attend the British Association meeting at Bradford in the same capacity, and will there describe some electrical investigations with which he has lately been engaged.

THE following international congresses upon scientific subjects will be held in connection with the Exposition at Paris during September : 3-8, History of Religion ; 3-5, Basque Studies ; 3-4, Pharmacy Specialities ; 10-16, Meteorology ; 10-12, Agri-

culture; 10-12, Folklore; 13-14, Fish Culture and Arboriculture; 14-19, Agriculture and Fisheries; 15-20, Aeronautics; 22-28, Acetylene.

PROF. GIARD, director of the biological station at Wimereux, has been made Chevalier of the Order of Leopold by the Belgian Government, as a recognition of the hospitality which he has extended to Belgian students and naturalists at his laboratory for many years.

DR. J. W. B. GUNNING, the director of the State Museum at Pretoria, speaks in high terms of the way in which he has been treated by the new British authorities. He has not only been confirmed in his post at the museum, but also materially assisted in his efforts to add to it a zoological garden, which he had planned before the outbreak of hostilities. It was to this (incipient) garden that the celebrated lioness (now in the Regent's Park Garden) was presented by Mr. Rhodes, but subsequently returned to the donor by Mr. Kruger's order.

AN international association for the promotion of psychical research has been established under the title: Société internationale de l'Institut Psychique. A *Bulletin* has been issued containing a report of the inaugural meeting held at Paris on June 30, and explaining the objects of the organisation. The Comité de Patronage includes the names of Prof. Mark Baldwin, Prof. W. F. Barrett, Sir William Crookes, Prof. O. J. Lodge, and Mr. W. H. Myers. The general secretary is M. Yourievitch, Russian Embassy, Paris.

A MONUMENT to Bertrand Pelletier and J. B. Caventou, renowned as pharmaceutical chemists, was unveiled at Paris, by M. Moissan, during the recent International Congress of Pharmacy. Caventou was born in 1795, and studied at the Paris School of Pharmacy. While pharmacist at the St. Antoine Hospital he met Pelletier, and their fruitful collaboration began. Two years after discovering brucine and strychnine they were able to announce the discovery of quinine, and with rare disinterestedness they made their work public by presenting an account of their methods and results to the Paris Academy of Sciences on September 11, 1820. In their memoir they stated that they had succeeded in isolating cinchonine and quinine from both yellow and red cinchona bark, and described the therapeutic properties of these substances. In 1827 the Montyon prize of the Academy of Sciences was awarded to them in recognition of their valuable discovery, and now the monument, representing the two investigators together, stands to remind observers of their joint services to science and humanity.

THE International Meteorological Congress will be opened at Paris on Monday, September 10, under the presidency of M. E. Mascart, and will continue during the week. The International Meteorological Committee, which met last year at St. Petersburg, decided that it would convene, at the same time as the Congress, the various committees appointed by the Paris Conference in 1896. These committees are the following:—(1) Terrestrial Magnetism and Atmospheric Electricity. (2) Aeronautics. (3) Clouds. (4) Radiation and Insolation. The first of these committees held an important meeting at Bristol in 1898, the proceedings and resolutions of which have been published in the reports of the British Association. A great number of ascents, both with free as well as captive balloons, have been made in different countries, for the systematic investigation of the upper regions of the atmosphere. Finally, the publication and discussion of the international observations of clouds, made in 1896-97, will probably be completed in 1900 in the majority of the countries taking part in the same. From this it will be seen that communications of very high interest will be brought before the Congress. The

questions which will be dealt with are not restricted exclusively to meteorology properly so-called: they will include, generally, everything which affects the physics of the globe. The meetings of the Congress and of the committees will be held at the House of the Société d'Encouragement, 44, Rue de Rennes, where the International Conference met in 1896. Communications relating to the organisation or to the programme of the Congress should be addressed to Mons. Angot, general secretary, 12, Avenue de l'Alma, Paris.

A REUTER telegram, dated Madrid, August 24, states that twelve fragments of a meteorite have fallen on the boundary of the provinces of Jaen, Cordova and Granada. The fall was preceded by a series of loud detonations. One fragment, weighing about a pound, which was picked up at Val, in the province of Jaen, is said to be of hexagonal shape, grey on the surface, and of a greenish colour inside.

As attempts are being made to found a domestic science, and to introduce exactitude into the operations of the kitchen, a note in the *Monthly Weather Review* recording the actual experience of a housekeeper at Albuquerque, New Mexico, is of interest. It appears that cooking recipes and practices which are trustworthy not far from sea-level are worthless at Albuquerque, the altitude of which is 4933 feet. Water boils there at 202° F., instead of 212° F.; hence articles of food, the cooking of which depends upon heat applied through the medium of water, require a longer time for cooking than is given in the cookery books. On account of the extreme dryness of the atmosphere, farinaceous foods, such as beans, corn, &c., lose so much of their moisture that they have to be left for a long time in water before cooking, in order to be softened. But the worst difficulty is with cake-making. Ordinary recipes as to number of eggs and amount of baking powder break down altogether, and housekeepers have to modify them if they wish their operations to be successful. As the barometric pressure determines to what extent the disengaged carbon dioxide shall expand and aerate the dough, this may explain the different action of baking soda and egg batter. In any case, the observation is interesting, and chemists may find it worthy of their attention.

*La Nature* of August 18 contains an article, by M. E. Roger, director of the meteorological station at Châteaudun, near Paris, entitled "The Greatest Heat of the Century." A temperature of 103°·6 in the screen was observed there on July 27 of this year. The nearest temperature to this hitherto recorded in the vicinity of Paris during the last hundred years was 101°·5 at Montsouris Observatory on the 20th of the same month. At Poitiers in July 1870, a temperature of 106°·2 was recorded. Among the highest temperatures recorded in or near London are 95°·2 at the late Mr. Symons' station, Camden Town, on July 16 last, and 97°·1 at Greenwich in July 1881; in that month a reading of 101° was obtained at Alton, Hants.

THE Pilot Chart of the North Atlantic Ocean for August, issued by the U.S. Hydrographic Office, contains a diagram showing the path of the noteworthy cyclonic tropical storms of the years 1898 and 1899, together with the time of their duration, which varies from 2 to 39 days; two of the storms were traced entirely across the Atlantic. Taken collectively, the several tracks exhibited show the doubtful accuracy of generalised statements concerning certain characteristics of these storms, such as their velocity, the latitude of their recurvature, &c. Thus the statement is often made that in the higher latitudes, after recurvature, the velocity along the track will average 25 or 30 miles an hour. However true this may be as the statement of an average, its untrustworthiness with regard to a particular storm is well shown by one of the tracks laid down,



in which the velocity of the centre after recurvature off the coast of Florida fell to about three miles an hour through three degrees of latitude.

WE have received a copy of the meteorological observations made at Sir Cuthbert Peek's observatory at Rousdon, Devon, for the year 1899, the sixteenth year of the series. This observatory is a second order station of the Royal Meteorological Society, and possesses a very complete equipment of instruments, both astronomical and meteorological, including various patterns of standard anemometers, the observation and comparison of which form a special and valuable feature of the regular work of the station. The mean temperature of the year exceeded the average by more than 2°; but the year was free from extremes in either direction, although at Greenwich on August 12 a temperature of 90° was recorded. The rainfall was about two and a half inches below the average, and amounted to only 29.31 inches; falls of an inch or more occurred on five days. A daily comparison is made between the actual weather and the forecasts of the Meteorological Office; as regards wind, the percentage of success has increased from 69 in 1884 to 93 in 1899, and in the case of weather, from 73 to 92 in the same period.

THE following notes from a report by Mr. H. A. Byatt, assistant collector, Fort Alston, are published with others in the *British Central Africa Gazette*:—"After passing over the ridge of hills which culminates about two miles to the east of Ndonda, some forty miles from the lake shore, the appearance of the country and the nature of its soil changes very considerably. In place of the low-lying marshy expanses along the coast, one finds a monotonous series of undulating grassy plains, covered almost exclusively with a growth of tall rank grass. The soil generally, though occasional small deposits of clay are found, consists of a layer of coarse porous sand, apparently of no great depth, lying upon a substratum of hard rock, and may well have been washed down by centuries of rain from the low hills above mentioned. The country is remarkably waterless. Judging by the appearance of the vegetation which it supports, the soil is of poor quality, and offers but little hope of successful cultivation. Large timber is conspicuous by its absence, and it is only at rare intervals that the raphia-palm and other trees requiring a copious supply of moisture are found; but possibly such woods as the Mlanje cedar might be introduced with success. Owing to the rank growth of grass, it is an ideal cattle country; but the true reason of the excellent condition of cattle in this country is to be found, I believe, in the presence of a certain salt in the earth—possibly a nitrate or phosphate of soda. In many places it is so abundant that upon the evaporation of the water it is left as a thick white deposit on the surface of the soil, whence it is gathered up by the natives and used as a condiment. Of other minerals, beyond the existence of graphite, I have so far found no trace."

THE progress of work on the new wheel-pit of the Niagara Falls Power Company, at Niagara Falls, N.Y., which is intended to supplement the present hydraulic installation of the same company, is described and illustrated in the *New York Electrical Review* (August 15). It is only a few years since the company began operations with a plant capable of being extended to 50,000 horse-power. Both the rapid growth of electrochemical industries at Niagara, and of electric power applications in Buffalo, twenty-six miles away, have rapidly carried the plant up to the limit of its former hydraulic equipment. Now the new one, which is slightly larger than the old, is under construction, and it is expected that within a year 105,000 horse-power will be generated and distributed from this one plant. The growth of such industries in the United States has been extraordinary. In New York State there is another plant under construction which will be finished within a year,

and will develop the enormous total of 150,000 horse-power. Practically all of the latter installation will be used in electrochemical work in the manufacture of carbides and caustic and bleaching powder.

THE manufacture of artificial dye-stuffs in Germany was referred to in a recent report from H.M. late Consul-General at Frankfort-on-Main. The endeavours of manufacturers and industrial chemists are directed, generally speaking, to producing the organic natural products, such as those of colour plants, dye woods, insects, molluscs, &c., by artificial and even cheaper and purer means, and in a more serviceable form for dyeing; also to producing new colours, which not only approach in brilliancy and effectiveness the natural kinds, but even surpass them. Since the discovery that the important dye-stuff madder—alizarine—could be produced in an easy and cheaper manner from the carburetted hydrogen of coal-tar, the use of dye-stuffs obtained by coal-tar distilling has gradually grown to such an extent that in Germany about five times as many artificial colours are made as in all other countries combined. According to the census in 1895, there existed twenty-five factories for the manufacture of aniline and aniline colours, and forty-eight factories (with seven branches) for the production of other coal-tar products (*i.e.* not only for colours, but also for other commodities, such as picric acid, &c.). The aniline works employ 7266 hands, the latter factories 4194; in all, 11,460 men.

IN connection with the foregoing note, the *Board of Trade Journal* gives some particulars as to the manufacture of artificial indigo in Germany, from a report to the Foreign Office. The importance of indigo is evidenced by the fact that the production of natural vegetable indigo equals in value the entire world's production of artificial dye-stuffs. The present artificial indigo of commerce represents almost pure indigotin. It is sold in the form of a 97 per cent. powder, whereas the indigotin contained in vegetable indigo fluctuates between 70 and 80 per cent. It contains no indigo-red, no indigo-brown and no indigo-blue. The lack of indigo-red and indigo-blue, which both seem to be of some importance in the relation of the dye-stuff to the fibre, are its special disadvantages. The indigo-red seems to be of importance in the production of darker shades of colour. There is no doubt that at some time not too far off it will be possible to produce this ingredient also. Artificial indigo is used by dyers in the same way as vegetable indigo. If it is possible to render the process of manufacture materially cheaper, and thereby to considerably reduce the price of artificial indigo, the danger to natural indigo will be greatly increased; it is, indeed, to be feared that with the increase of chemical knowledge the same fate awaits this dyeing plant, which is extensively cultivated in British territories, as overtook the Krapp plant, the cultivation of which nowadays no longer pays. Artificial indigo affords a new example of the manner in which applied science revolutionises the most varied spheres and destroys as well as creates great wealth.

THE *Atlantic Monthly* for August contains an account, by Mr. Sylvester Baxter, of a method devised by Mr. Arthur J. Mundy, whereby a ship may be guided into port in stormy weather which prevents ordinary signals from being of service. The method is called "Acoustical Triangulation." It is based on the property that sound travels under water with a velocity that is unaffected by the disturbances such as winds, which have so large an influence on the propagation of sound-waves in air; and the putting of this principle into practice depends on the invention of a successful apparatus for ringing a bell under water by electrical connections. Three bells placed at the corners of a triangle, preferably equilateral, are sounded at known intervals of time. By noting the intervals of time between the instants when the first and second bells are heard, the locus of the ship's

position is known to be one of the branches of a certain hyperbola the foci of which are the two bells. By noting the apparent interval between the second and third bell, the ship is similarly located on another hyperbola, and the intersection of the two curves gives the required position of the ship. The only objection to the method appears to us to be that a pair of hyperbolic branches may intersect in *two* points, so that for given intervals between the bell sounds the position of the ship may be ambiguous. This could be avoided by having four bells instead of three.

At the annual meeting of the Physical and Natural History Society of Geneva, Prof. A. Pictet surveyed the work which had been brought before the society during 1899. Eighteen meetings were held, and no less than seventy-three communications or reports were read. M. F. L. Perrot and Prof. Guye have made a series of measures of surface tension of various liquids by the method of falling drops. The conclusion arrived at as a result of their observations was that these tensions are not proportional to the weight of the drops. A new recording telephone was described by M. F. Dussan<sup>d</sup>. M. T. Tommasina has studied the variations of conductivity of coherers, and M. E. Steinmann has contributed a note on the thermo-electricity of various alloys. To the section of chemistry and mineralogy, M. Louginine has contributed an important memoir on the latent heat of evaporation of some organic liquids; MM. Dutoit and Friderich have determined the molecular weights of some organic liquids by the method of capillary ascensions; Prof. A. Pictet and M. Athanasescu have presented a note on the constitutional relation between two alkaloids of opium—papaverine and laudanine; M. Duparc has described his researches on the Liparite rocks of Algeria; and M. H. Auriol has made a detailed study of the agricultural soils of the Canton of Geneva. In the section of botany, M. de Candolle stated that grains of wheat which he had kept for four years under mercury had germinated and produced normal plants; and Prof. Chodat has described several micro-organisms of plants. Among the subjects of papers contributed to the section of zoology and anthropology are the development of the wings of Lepidoptera, by M. A. Pictet; and a comparative study of a series of skulls from old burying-places in the Valais district, by M. Pitard. In the section of physiology and medicine, Prof. J. L. Prevost and Dr. Battelli have described their detailed researches on the action of electric currents upon animals; and M. Babel has given an account of his work on the comparative toxicology of aromatic amines.

THE present trend of legislation in the interests of fish preservation in the United States is, Dr. Whitten remarks (*State Library Bulletin*, No. 12, New York), to place more reliance on methods of fish propagation than on a multiplicity of vexatious restrictions, and to obtain through scientific research the knowledge essential to enlightened regulation. In 1871 the United States commission of fish and fisheries was created to undertake scientific investigations, collect information, and to further the introduction and multiplication of food fishes, particularly in waters under national jurisdiction. In 1898 the commission maintained 34 fish-cultural stations and distributed 857,509,546 eggs, fry and adult fish. Fish commissions have been created in every State except Kentucky. Many of the commissions exist primarily for protective purposes, but others carry on valuable scientific work and maintain hatcheries and stock local waters with the most valuable food fishes. Illinois has a zoological station, and Oregon has created the office of State biologist for the investigation of the animal resources of the State and the development of such as have economic value.

THE relation of the cell to the enzymes, or soluble ferments which originate from cells, was touched upon by Sir J. Burdon-Sanderson, Bart., in the address he delivered before the recent

International Medical Congress at Paris. Formerly, he pointed out, each kind of cell was regarded as having a single special function proper to itself, but the progress of investigation has shown that each species of cell possesses a great variety of chemical functions and that it may act on the medium which it inhabits, and be acted upon by it, in a variety of ways. Thus, for example, the colourless corpuscles of the blood (or, as they are now called, leucocytes) are considered not merely as agents in the process of suppuration or as typical examples of contractile protoplasm, but rather as living structures possessing chemical functions indispensable to the life of the organism. Similarly, the blood disc, which formerly was thought of merely as a carrier of hæmoglobin, is now regarded as a living cell possessed of chemical susceptibilities which render it the most delicate reagent which can be employed for the detection of abnormal conditions in the blood. The tendency of recent research is to show that the reactions referred to as chemical functions of the cell (action of the cell on its environment—action of the environment on the cell) are the work of ferments—intrinsic or extrinsic—which are products of the evolution of the living cell, and therefore to which the term enzymes may be applied.

RECENT researches have plainly indicated that in the case of the disease-producing micro-organisms, the specific functions which for years were regarded as proper to, and inseparable from, the cell belong essentially to the enzymes which they contain. It has been further shown that similar statements can be made as regards ferment-processes which differ widely from each other and no less widely from those induced by bacteria. So that in the domain of microbiology the enzyme may in a certain sense be said to have "dethroned the cell." For if, as M. Duclaux has said, it is possible to extract from the cell a substance which breathes for it, another which digests for it, another which elaborates the simple from the complex, and finally another which reconstitutes the complex from the simple, the cell can no longer be considered as *one*, but rather as a complicated machine, the working of which is for the most part dependent on enzymes, which, however numerous and varied may be the processes in which they are engaged, all follow and obey the universal law of adaptation, and all contribute to the welfare and protection of the organism.

IN our last week's issue reference was made to Dr. Haller's views as to the relationships of the different groups of the Vertebrata, based on his study of the hag-fishes and lampreys. And in the July number of the *Journal of Anatomy and Physiology* the subject of the origin of Vertebrates, as deduced from the study of the larval lamprey (Ammocetes), is resumed by Dr. Gaskell. In this important communication the author arrives at the conclusion that Ammocetes is a representative of the Devonian Cephalaspids, and also that a larval form of the latter group must have existed which was of the nature of the Eurypterid Crustaceans. Again, judging from the development of Limulus, it would appear that the larval Eurypterid resembled a Trilobite, and there is evidence that Trilobites are Phyllopod, which are almost certainly derived from Chaetopod Crustaceans. Admitting the derivation of the lampreys from Cephalaspids, we find that the latter, in their adult condition, approximate to larval Amphibians; and we hence pass from the latter to the lower Mammals, and so on to Man. Thus, according to Dr. Gaskell, the study of Ammocetes, owing to the importance of larval forms, enables us to bridge the gulf between the Annelid and Man.

THE greater portion of the July number of the *Quart. Journ. Microscopical Science* is occupied by a communication from Messrs. F. W. Gamble and J. H. Ashworth on the anatomy and classification of the Sandworms (Arenicolidae). This is followed by a most interesting series of diagrams illustrating the life-history of the parasites of malaria, by Messrs. Ross and



Fielding-Ould, accompanied by a short explanatory text. The diagrams were originally intended to illustrate a lecture delivered at the Royal Institution, to which reference is made in NATURE of March 29. The authors adopt the name Hæmamebidæ for the intracorpular amœba-like bodies which occur in the blood of certain animals. Of these, three species occur in human beings (producing the various types of malarial fever), one in monkeys, three in bats, and two in birds. Only the human and avian forms are illustrated. The development of four of these has been followed in gnats; the three human forms living in Anopheles, while the bird-infesting species dwells in the common *Culex pipiens*. To this paper Prof. E. Ray Lankester appends a separate communication describing the generative process in the aforesaid "Hæmamebids" and in the allied Coccidiidæ, which are parasitic in cuttle-fish. Sexual conjunction, or "zygosis," has recently been demonstrated to occur in the former group, and shortly before certain peculiar bodies known as microgametes and macrogametes were found to occur in the latter. These Prof. Lankester now shows respectively correspond to the spermatozoa and ova of higher organisms, specimens of the Coccidiidæ being figured in which the process of fertilisation by the microgametes is actually taking place.

To vol. xiii. Part I of the *Annals* of the New York Academy of Sciences, Prof. H. F. Osborn contributes an important paper on the correlation between the Tertiary mammalian horizons of Europe and America. The author is of opinion that the Puerco Eocene of the United States has no parallel in the European series, and that the Egerkingen beds of Switzerland are newer than the Wasatch. The three main divisions of the European Miocene are correlated with the Loup Fork and a portion of the John Day groups of America. But the most generally interesting portion of the paper is that in which Prof. Osborn enunciates his views with regard to former land connections. The theory of an extensive Antarctic continent synchronously connecting South America and Australia, and also communicating at some epoch with Africa, is deemed to be demonstrated. And it is considered that South America has experienced four distinct streams of faunal migration. In the first it received its peculiar Ungulates and Edentates; in the second it yielded the ancestors of Aard-varks, Pangolins, and perhaps Hyraces, to Africa; during a third land connection Marsupials immigrated from Australasia; and in the fourth the modern North American types effected an entrance. In contradistinction to the general view that Africa received its fauna from the north, the author is of opinion that the Dark Continent was itself the great dispersing centre and theatre of evolution; but whether South America received its original fauna from Africa or from North America is left an open question.

AMERICAN zoologists continue to devote their attention to the mammals of the Old World; and in the *Proceedings* of the Washington Academy of Sciences for July, Mr. G. S. Miller publishes two papers on the squirrels of Siam and Malacca, as well as a third on the European red-backed field-mice. Mr. Bonhote has just been writing on the former subject in the *Annals of Natural History*, and it seems a pity that naturalists cannot agree to divide their work so as to avoid overlapping and consequent unnecessary multiplication of names.

THE *Zoologist* for August contains an interesting account of a visit to Lundy Island during the nesting season, by Mr. F. L. Blathwayt. In the course of the paper allusion is made to the tradition that the Great Auk, or some equally large unknown bird, formerly inhabited the island. Only one or two pairs of this bird were known to the islanders, but an egg (subsequently broken) was secured in 1839. This subject seems worthy of further investigation.

WE are glad to see that in its September issue the *Gir's Realm* is endeavouring to awake an interest in the animal life of the sea-shore among its numerous juvenile readers, by publishing an illustrated article, entitled "An Hour in a Drang," by Mr. E. Step. "Drang," we learn, is Cornish for a deep cleft; and in his admirable description of such a cleft among the rocks at low tide, the author introduces his young friends to its living inhabitants in such a delightful manner that he can scarcely fail to gain many converts to the study of natural history. The photographs of crabs and lobsters with which the article is illustrated are admirably presented.

A *Bulletin* (Technical Series, No. 8) just issued by the U.S. Department of Agriculture (Division of Entomology) contains contributions towards a monograph of the American Aleurodidae, by Mr. A. L. Quaintance, and a paper on the Red Spiders of the United States (*Tetranychus* and *Stigmæus*), by Mr. Nathan Banks. We have only one or two species of the interesting homopterous family Aleurodidae in England. They are garden insects, which have a superficial resemblance to small white moths. In the present monograph forty-two American species of Aleurodes (Latreille) are described, most of them for the first time, and ten others belonging to the genus *Aleurodicus* (Douglas). To these the plates refer. The second paper, which is illustrated by wood-cuts, relates to the mites improperly called Red Spiders, which are equally troublesome in gardens and greenhouses in Europe and America. Of the two genera here discussed, ten species of *Tetranychus* (Dufour) and one of *Stigmæus* (Koch) are described; several as new. It is rather a pity that the term entomology is used in England so narrowly as practically to exclude mites, spiders, centipedes, &c., from entomological publications, and thus to hinder the popularisation of knowledge respecting them. In America, entomology is given the wider extension which it possessed at the beginning of the century, as may be seen by the inclusion of mites in the present publication.

THE members of the Manchester Microscopical Society deserve a word of encouragement for the efforts they make to extend a knowledge of natural history. One section of the society is entirely concerned with this work, and the members of it propagate the gospel of natural history by lecturing and demonstrating wherever their services are required. A programme containing a list of nearly fifty subjects has been issued, and the honorary secretary, Mr. George Wilks, 56, Brookland Street, Eccles New Road, Manchester, will arrange for lectures or demonstrations upon any of them if a communication is made to him.

THE two last numbers of the *Bulletin* of the Free Museum of Science and Art of Philadelphia show that this institution is growing rapidly under the care of Mr. Cu'in. The more important recent additions are figured. In vol. ii. No. 3 is an account of the historical Dickeson collection from the Mississippi mounds, and in the following number is a descriptive catalogue of the Berendt collection of books and manuscripts on the languages of Central America in the Museum Library, carefully compiled by the late Dr. Brinton.

THOSE interested in the decorative art of primitive folk should consult two fully illustrated papers in the *American Anthropologist* (N.S. vol. ii. No. 2, 1890). One, by Mr. R. B. Dixon, deals with basketry designs of the Maidu Indians of California, in which animal and plant forms, feathers, arrow heads, mountains and clouds are plaited in a very conventional manner. The author makes the significant remark, "The knowledge of the designs is almost exclusively confined to the older women, the younger generation knowing only very few." The second paper is one by Mr. B. Laufer, on the Amoor tribes, and is a preliminary account of the work done by this observer on the Jesup North Pacific

Expedition. Mr. Laufer gives a careful analysis of zoomorphic patterns, mainly of the Gold tribe; their decorative art shows distinct traces of Chinese influence, but the designs have been evolved in an original and interesting manner.

THE catalogue of bacteriological and pathological apparatus, just published by Messrs. J. J. Griffin and Sons, contains several new instruments and accessories, and will well repay inspection. Among the apparatus we notice several spirit Bunsen burners, which can be used instead of ordinary Bunsen burners where gas is not available. These are, of course, suitable for any laboratory, and not merely for bacteriological work. Of special interest are a number of new centrifuges for use in the examination of blood, sputum, milk. In water, urine and milk analysis a comparatively low rate of revolution is required, and a hand centrifuge giving up to 2000-3000 revolutions a minute is sufficient. When examining blood or sputum it may be necessary to make upwards of 10,000 revolutions a minute, which rate can be obtained by a water-power centrifuge manufactured by Messrs. Griffin. Another noteworthy addition is a special test-tube possessing characteristics always required for bacteriological work, but rarely found.

THE additions to the Zoological Society's Gardens during the past week include a Javan Mynah (*Gracula javanensis*) from Malacca, presented by Mr. George Smith; an Indian Crow (*Corvus splendens*) from India, presented by Mr. E. A. Williams; a Rose-coloured Pastor (*Pastor roseus*) from India, an Indigo Finch (*Cyanospiza cyanea*), a Nonpareil Finch (*Cyanospiza ciris*) from North America, presented by Mr. L. Ingram Baker; a Raven (*Corvus corax*), European, presented by Mr. G. St. Leger Hopkinson; three Blackish Sternotheres (*Sternotherus nigricans*) from Madagascar, two Prasin Snakes (*Coluber prasina*) from Upper Burma, eleven American Box Tortoises (*Cistudo carolina*) from North America, deposited; an Occipital Blue Pie (*Urocissa occipitalis*) from the Western Himalayas, ten Common Chameleons (*Chamaeleon vulgaris*) from North Africa, purchased; a Brush-tailed Kangaroo (*Petrogale penicillata*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

- ASTRONOMICAL OCCURRENCES IN SEPTEMBER.
- Sept. 1. 8h. Jupiter in conjunction with the moon. Jupiter,  $0^{\circ} 51'$  North.
  - 3. 7h. 16m. to 8h. 11m. Moon occults the planet Saturn.
  - 4. 7h. 35m. to 8h. 50m. Moon occults the star  $\xi^1$  Sagittari (mag. 5.0).
  - 5. 7h. 24m. Transit (ingress) of Jupiter's Sat. III.
  - 12. 12h. 35m. to 13h. 43m. Moon occults  $\pi$  Arietis (mag. 5.6).
  - 12. 16h. 27m. to 17h. 40m. Moon occults  $\rho^3$  Arietis (mag. 5.5).
  - 13. 9h. 43m. to 10h. 34m. Moon occults 13 Tauri (mag. 5.4).
  - 14. 8h. 39m. to 9h. 18m. Moon occults D.M. +  $20^{\circ}$ , 785 (mag. 5.8).
  - 15. Venus. Illuminated portion of disc = 0.493.
  - 15. Mars. " " " " = 0.915.
  - 16. 12h. 8m. Minimum of Algol ( $\beta$  Persei).
  - 17. 6h. Venus at greatest elongation.  $46^{\circ} 1'$  West.
  - 18. 14h. 48m. to 15h. 40m. Moon occults 29 Cancr (mag. 5.9).
  - 19. 8h. 57m. Minimum of Algol ( $\beta$  Persei).
  - 23. oh. Sun enters Libra, autumn commences.
  - 27. Saturn. Outer minor axis of outer ring =  $17'' 25$ .
  - 28. 21h. Jupiter in conjunction with the moon. Jupiter,  $0^{\circ} 13'$  North.

RING NEBULA IN LYRA.—It is interesting to find in the *Bulletin de la Société Astronomique de France*, August 1900, an account of the first published work done with the great 50-inch refractor of the Paris Exposition while that exhibition is still in progress. M. Eugène Antoniadi, of the Juvisy Observ-

atory, has been for some time making systematic observations of nebulae with the instrument, and a drawing showing a considerable amount of detail accompanies his paper on the Ring Nebula, the first of the series he has undertaken to study. He mentions that the lens used is the photographic one, the other, specially corrected for the visual rays, not yet being in position. The focal length of this glass is about 186 feet (57 metres).

OCCULTATION OF SATURN.—On Monday evening next, September 3, there will be an occultation of Saturn by the moon, for which the following particulars for Greenwich may be useful:—

	Sidereal Time.	Mean Time.	Angle from	
			North point.	Vertex.
Disappearance ...	18 6 ...	7 16 ...	128 ...	126
Reappearance .....	19 1 ...	8 11 ...	217 ...	206

Providing the weather be favourable, this should be an excellent opportunity for observing the occultation of the planet, as the altitude will be almost at its maximum, meridian passage at Greenwich occurring at 7h. 7m. G.M.T. Moreover, from its being such a bright object, observations may be made with instruments of the lowest optical power.

In the *Bulletin de la Société Astronomique de France* for August 1900, M. M. Honorat gives an illustrated description of his observation of the last occultation of Saturn on June 13. He mentions the conspicuous contrast between the slightly yellowish colour of the moon and the greenish tint of the planet. During the occultation the planet appeared separated from the lunar limb by a narrow shadow about  $5''$  of arc in width, probably a contrast effect.

At the reappearance of Saturn at the terminator, he could not perceive any trace of penumbral shadow cast on the planet's disc.

OPPOSITION OF EROS.—Two additional circulars have been issued by the special committee appointed by the Astrographic Conference to direct the observations of Eros during the coming opposition. Special attention is drawn to the work which may be commenced at once, such as micrometric observations with all equatorials of large aperture, for furnishing definite positions for the theory of the planet's movement, and that these should be published as soon as possible, to perfect the ephemerides for the actual parallax work later. An ephemeris is included from the computations of M. Millosevich, and tables showing the limiting times between which the planet will have an altitude greater than  $20^{\circ}$  at various latitudes, and also a table indicating the proper regions to be included on the photographs on dates extending from September 19 to January 7.

In the *Astronomische Nachrichten* (Bd. 153, No. 3656), Prof. S. J. Brown, of the U.S. Observatory at Washington, calls attention to the many opportunities for simultaneous micrometer observations at widely separated stations, and as many observatories are not equipped with the photographic instruments necessary for the more general programme contemplated, gives data for assisting micrometer observers to co-operate for this type of work alone. The high declination of the planet makes it possible to secure simultaneous observations at all the Eastern stations west of Pulkowa, and at all the American observatories east of Denver. He also gives a table showing the Greenwich Mean Time at which the planet will be simultaneously visible at the observatories of Pulkowa, Königsberg, Vienna, Evanston, Madison, Yerkes and Denver for intervals of ten days from 1900 October 1-1901 January 19. Careful sketches of the comparison stars in the field should be made to facilitate subsequent identification. Owing to the rapid orbital motion of Eros rendering observations for position angle and distance very troublesome, measures should be made in rectangular co-ordinates referred to the true equatorial position of the fixed micrometer wire.

THE INTERNATIONAL PHYSICAL CONGRESS.

THE first International Congress of Physics, which has just finished its sittings, has been a brilliant success. The number of participators exceeded a thousand, and, in spite of the attractions which Paris always offers, in spite of the simultaneous rivalry of the Universal Exhibition itself, sectional and general meetings were closely followed up to the last day by a great number of visitors.